

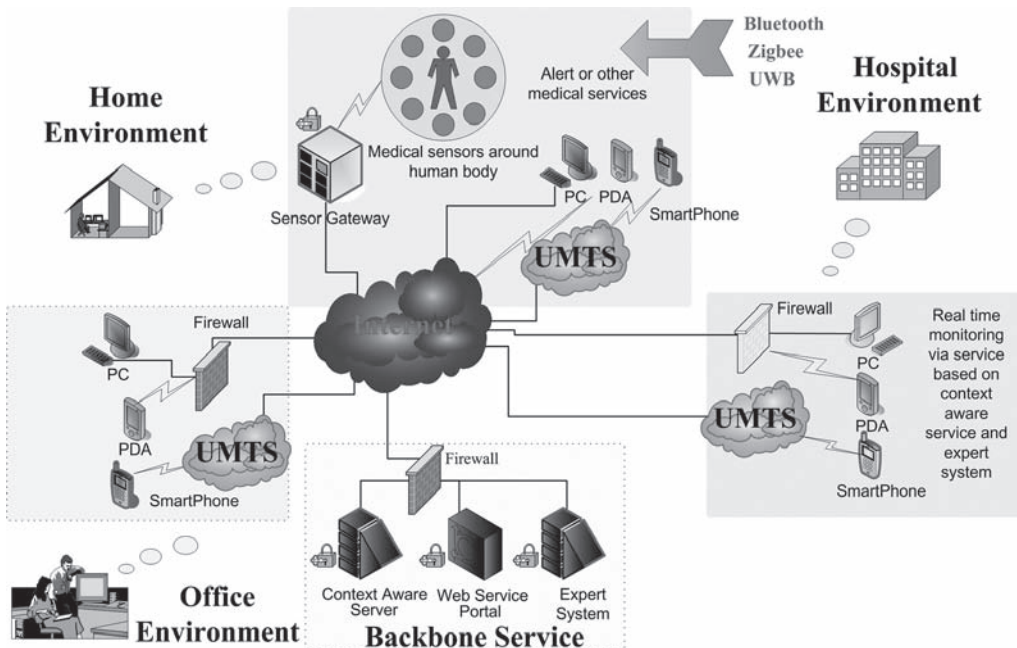
Wireless e-health (WeHealth) for the aging society in China

Applying wireless implanted medical sensors enables monitoring and control of situations and medical conditions such as coronary care, diabetes, muscle stimulants, etc.¹. The rapid development of wireless sensor and networking techniques has given sensors various functionalities, and allows them to be end-nodes in the ubiquitous computing environment. New developments in wireless ICT infrastructure technology (Bluetooth, Zigbee, UWB, WLAN) make wireless e-health (WeHealth) even more attractive and suitable for medical applications². WeHealth enables professional real-time monitoring and therapy support as well as private user access to monitoring, medical assistance and individual care services in future pervasive and ubiquitous computing environments.

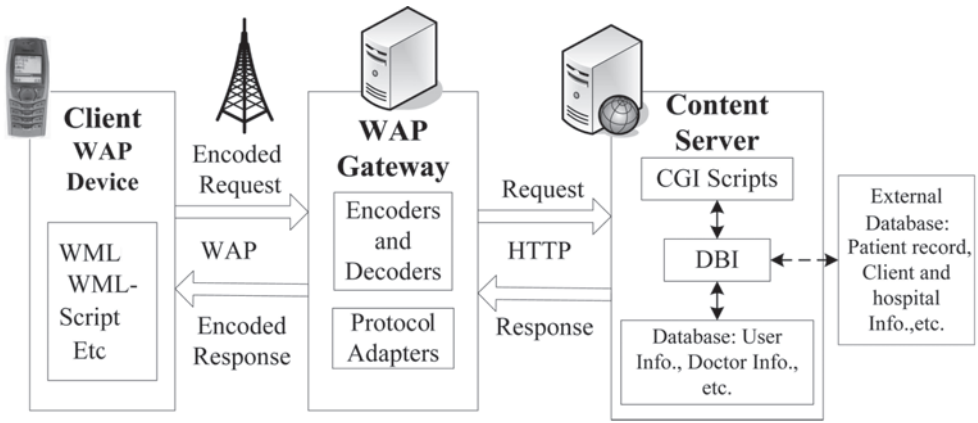
The figure shows the infrastructure of WeHealth for an aging society. The various

matured wireless access techniques and networks, such as short range wireless communications, wireless local area network, as well as wide range wireless communications, can be applied to provide advanced and convenient healthcare services.

In the **home environment** the physiological sensors (such as blood pressure sensors, heart rate sensors) or non-physiological sensors (such as the action detection sensor) are attached to the body to collect the parameters of the patient in care, typically a senior person in a future aging society. The collected data are transmitted through short-range wireless (Bluetooth, Zigbee, or UWB) transmitters to the home gateway, that might be embedded into home ADSL, PC, mobile phone, PDA, etc. Through a home gateway the patient's daily data are sent to the hospital to implement real-time monitoring and expert instruction to the



Infrastructure of Wireless eHealth (WeHealth) stretching from home and hospital environments to the office environment through UMTS and internet, to capture life signs and physiological signals of older adults living at home



Architecture of a WAP-based platform to access remote databases in hospitals and health centers through mobile terminals

patient. A variety of healthcare services can be developed through the platform of the home environment. A typical service example is the monitoring of a chronic disease (diabetes, heart condition, etc).

In the **hospital environment** the wireless local area network can be configured to improve the medical information access and exchange capability between patients and doctors, or between doctors and the hospital database. The patient's electronic prescription and data from their physiological monitoring systems fall within the above mentioned categories, and can be conveniently transmitted through wireless access such as WLAN. Various applications can be developed in hospitals to access and exchange this information, and the terminals are normally PDAs or other mobile devices with larger screens (such as a tablet PC) due the amount and diversity of the displayed medical information.

Within the **office environment** an average person might receive services through a wide area wireless network, such as GPRS, 3G (WCDMA or CDMA 1X), etc.³. These services may be diverse including the daily health information broadcast through SMS, the mobile registration to the hospital and so on.

In general, information can be transferred among home, hospital, the office environ-

ments and elsewhere. For instance, data from the patient monitored at home can be transferred to his/her relatives in their office to keep them aware of the patient's health status. Our initial experiences with such a system indicate authorized users (doctors or patients' relatives) typically view the patients' monitored physiological parameters on wireless devices in store-and-forward mode. The first practical system was based on WAP services, and operates on both GPRS and GSM mobile networks. The system architecture as shown above, illustrates the connection between the WAP device and the content server through the WAP gateway. Applications are stored in the content server and the user interface, which is written in WML and PHP, is executed at the WAP device after it has been downloaded from the server.

The practical implementation of services or applications is less of a technical than a social issue, and cooperative work to establish the system requirements should occur among policymakers, hospitals, researchers, engineers, trainers, and the patients themselves⁴. Successful development and deployment of the WeHealth systems, as has been established in Beijing (China), is geographically influenced by national regulations, regional economic development, demographic trends and available medical infrastructures and resources.

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